



POWERTECH

NEWSLETTER OF IEEE PES YP

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ELECTRIC VEHICLES



Electric Vehicles

In March's Newsletter, we bring varied information regarding **Electric Vehicles**.

1. Research Articles
2. Standards
3. Trainings
4. Webinars



Electric Vehicles

Electric Vehicles

- **Challenges:** Electric Vehicles have been showing a feasible and ecologic solution for decarbonization. However, there are still some challenges slowing down its wide utilization and acceptance. The high initial cost, lack of charging stations, and charging time are factors impacting the customers' acquisition. On the utilities side, the large amount of EVs integration can bring several impacts on energy supply, lines congestion and power quality.



Electric Vehicles

Electric Vehicles

- **Solutions:** Most of the time, EV are shiftable loads, that can be charged when is more technically and economic feasible. The charging management can not only minimize energy costs for EV users by also provide ancillary services to the systems, support voltage and frequency control. By this, EV management can be beneficial for both users and utility.



Electric Vehicles

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- **Gaps:** Although EVs have received great attention from researchers, there are still some development gaps to scale up the production, acquisition and use of EVs. The main gap is related to battery energy storage solutions. Currently, most EVs are built with lithium-ion and nickel-metal hydride batteries. Advances in batteries directly impact cost, autonomy and charging time, which are critical factors for acquiring new customers. As a side effect, the development of EVs will require coordination of network operation. Studies for optimal location of charging stations, charging scheduling and use of EVs as auxiliary services are prospective for application in utilities.



Electric Vehicles

1. Research Articles

- **Title:** “Electric Drive Technology Trends, Challenges, and Opportunities for Future Electric Vehicles”

Contributions: Transition to electric road transport requires electric traction drive systems to offer improved performances and capabilities. The U.S. Department of Energy has announced the technical targets for light-duty electric vehicles (EVs) for 2025. This article discusses the electric drive technology trends for passenger electric and hybrid EVs.

Available at:

<https://ieeexplore.ieee.org/document/9316773>



Electric Vehicles

- **Title:** “State of the Art and Trends in Electric and Hybrid Electric Vehicles”

Contributions: Electric and hybrid electric vehicles (EV/HEV) are promising solutions for fossil fuel conservation and pollution reduction. Design of energy-efficient powertrains requires optimization of components, systems, and controls. Issues in the current research are discussed, and suggestions toward further advancement of the technology are offered.

Available at:

<https://ieeexplore.ieee.org/document/9422914>



Electric Vehicles

- **Title:** “Innovative Approaches for Electric Vehicles Relocation in Sharing Systems”

Contributions: This article presents two methods for solving the electric vehicles (EVs) relocation in EV-sharing system. In both, two integer linear programming (ILP) problems are formulated to minimize the relocation cost. Future research will focus on the EVs relocation problem in free-floating sharing systems.

Available at:

<https://ieeexplore.ieee.org/document/9519966>



Electric Vehicles

- **Title:** “Modeling of System-Level Conducted EMI of the High-Voltage Electric Drive System in Electric Vehicles”

Contributions: A model of the HEDS based on the vehicle is established to predict conducted electromagnetic interference. The motor model takes into account the low-impedance antiresonance phenomenon. The proposed model can accurately predict the system-level conducted EMI up to 100 MHz

Available at:

<https://ieeexplore.ieee.org/document/9715977>



Electric Vehicles

- **Title:** “Planning Strategy for an Electric Vehicle Fast Charging Service Provider in a Competitive Environment”

Contributions: Fast charging is a promising method of energy refueling for electric vehicles. Multiple charging service providers (CSPs) are participating in the investment of EV fast charging facilities. CSPs inevitably bring competition among each other, which affects the planning decision of ESSs.

Available at:

<https://ieeexplore.ieee.org/document/9715093>



Electric Vehicles

2. Standards

- **Title:** “IEC 61851”

Contributions: IEC 61851 is an international standard for EV conductive charging systems.

Documents:

- IEC 61851-1: General requirements.
- IEC 61851-21-1: Electric vehicle on-board charger EMC requirements for conductive connection to AC/DC supply.
- IEC 61851-21-2: Electric vehicle requirements for conductive connection to an AC/DC supply - EMC requirements for off board electric vehicle charging systems.
- IEC 61851-23: DC electric vehicle charging station.
- IEC 61851-24: Digital communication between a DC EV charging station and an electric vehicle for control of DC charging.
- IEC 61851-25: DC EV supply equipment where protection relies on electrical separation.



Electric Vehicles

3. Trainings

- **Title:** “The ABC's of EVs”

Scope: Electric vehicles (EVs) have the potential to reduce fossil fuel consumption and increase energy independence. If their charging is managed properly, they can also be a tool for fortifying the grid and increasing the integration of renewable energy sources such as wind and solar. However, there are many differences in the ownership experience between a traditional internal combustion vehicle and an EV. These range from maintenance requirements and daily refueling, to road tripping and group charging with other EV owners. This presentation will focus on the various issues associated with daily EV usage and EV ownership.

Available at:

<https://resourcecenter.ieee-pes.org/education/webinars/PESVID1186.html>



Electric Vehicles

- **Title:** “Opportunities and Challenges for Synergies between Renewable Resources and Electric Vehicles”

Scope: Electric vehicles (EVs) have the potential to reduce fossil fuel consumption and increase energy independence. If their charging is managed properly, they can also be a tool for fortifying the grid and increasing the integration of renewable energy sources such as wind and solar. However, there are many differences in the ownership experience between a traditional internal combustion vehicle and an EV. These range from maintenance requirements and daily refueling, to road tripping and group charging with other EV owners.

Available at:

https://resourcecenter.ieee-pes.org/conferences/general-meeting/PES_CVS_GM21_0726_2938.html



Electric Vehicles

- **Title:** “VEHICLE-TO-GRID”

Scope: Electric Vehicles are evolving into mainstream products as many vehicle manufacturers now offer multiple product lines incorporating electric drive technologies. Batteries are becoming larger, and high-power DC Fast charging is becoming available for many models. Many residential and EV owners are also acquiring and integrating clean energy solutions such as Solar PV with smart inverters and local battery storage. Wireless and power line communication and control networks are enabling electricity market transformations. Speakers: Paul Heitmann, Businovation, LLC John Halliwell, EPRI Ron Melton, PNNL.

Available at:

<https://resourcecenter.ieee-pes.org/conferences/isgt/PESLI1109.html>



Electric Vehicles

4. Webinars

- **Title:** “PES Day”

Scope: Every year, a theme is selected, and celebrations, including educational and humanitarian activities, youth programs, and technical contests, are organized for our members. PES Day goal is to engage the PES volunteers with PES history and “5” PES pillars of the “More Power to the Future” vision:

- Advancing global participation
- Educating the Future Workforce
- Industry Activity Trends
- Standards Leadership
- Participating in Regulatory Initiatives

Available at: <https://ieee-pesday.org>





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